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Masashi Naito

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EXAMINER

WONG, LINDA

ART UNIT

PAPER NUMBER

2634

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/026,614	Applicant(s) NAITO ET AL.	
	Examiner Linda Wong	Art Unit 2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-7,9 and 11-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5-7,9 and 11-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 September 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☒ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Response to Arguments

1. Applicant's arguments, see Applicant's Arguments, filed 9/14/2005, with respect to the rejection(s) of claim(s) 1-14 under Aizawa et al have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Marchetto et al (US Patent No.: 5666378) in view of Aizawa et al (US Publication No.: 20020181574).

Information Disclosure Statement

2. Regarding unconsidered non-patent literature disclosed in the information disclosure statement filed May 08, 2002, the information disclosure statement fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered. Non-patent literature titled "Simplified Decision Feedback Equalizer Using Interpolation", (Sanbe, et al., Technical Report of Institute of Electronics, Information and Communication Engineers (CS91-22(1991-06) pp. 37-43) cannot be found within the submitted prior art. Please submit a copy of the non-patent literature and the non-patent literature will be considered.

Drawings

3. The drawings were received on 9/14/2005. These drawings are accepted.

Specification

4. The abstract of the disclosure is objected to because on page 33, line 8, the abstract states "a detection signal obtained by detecting a transmission signal with periodically inserted known symbol patterns made up of at least one symbol". As stated in the specification, the detection signal is produced from a reception signal, received from the antenna. The disclosure, page 16, line 2-5, states "A reception signal received by the antenna 201 is subjected to quadrature detection by the detection section 202, and its output as a quadrature detection I/Q signal to the equalization processing section 203, ..." The disclosure indicates the reception signal goes through the detection unit, not a transmission signal. Correction is required. See MPEP § 608.01(b).
5. The disclosure is objected to because of the following informalities:
 - a. On page 7, line 16, page 8, line 9, page 9, line 12, page 10, line 19, page 11, line 8, page 12, line 10, line 28, discloses the detection signal is produced by detecting a transmission signal with periodically inserted known symbol patterns made up of at least one symbol and receiving the transmission signal by a plurality of antennas. As discussed in the 35 USC 112 rejection, the invention as described in the title is a receiver, not a transmitter. Also, the line "receiving the transmission signals by a plurality of antennas" indicates the signal is a

received signal, not a transmission signal. Furthermore, on page 16, line 2-5, states "A reception signal received by the antenna 201 is subjected to quadrature detection by the detection section 202, and its output as a quadrature detection I/Q signal to the equalization processing section 203, ..."

The disclosure indicates the reception signal goes through the detection unit, not a transmission signal.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. **Claims 1,2,3,5,7,9,11,13** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In the disclosure and title of the disclosure, the invention is a receiver, not a transmitter.
 - a. **Claim 1, line 1-3**, recites the limitation in the preamble, which is assumed will be changed to be part of the body of the claim, "a detection signal obtained by detecting a transmission signal". Since the invention is a receiver, not a transmitter, a detection signal cannot be produced by "detecting a transmission signal". It is suggested by the examiner that the term "transmission signal" is changed to "reception signal" to comply with the invention and the disclosure.

The disclosure, page 16, line 2-5, states "A reception signal received by the antenna 201 is subjected to quadrature detection by the detection section 202, and its output as a quadrature detection I/Q signal to the equalization processing section 203, ..." The disclosure indicates the reception signal goes through the detection unit, not a transmission signal.

- b. **Claim 2, line 1-2**, recites the limitation "said transmission signal is modulated with 16QAM..." The disclosed invention is a receiver, not a transmitter, thus the received signals should be demodulated, not modulated transmission signals. On page 17, lines 12-16, the disclosure states "As described in the reference 1, the pilot symbol pattern generator 205 outputs one of the 16 QAM symbol mapping values used as a pilot symbol pattern to the subtracter 206 ..." The disclosure indicates the symbols are mapped to the known symbols, 16QAM symbols, thus demodulating the received signal.
- c. **Claim 3, line 1-2**, inherits all the limitations of claim 1.
- d. **Claim 5, line 1-2**, inherits all the limitations of claim 1.
- e. **Claim 7, line 3**, inherits all the limitations of claim 1.
- f. **Claim 9, line 2-3**, inherits all the limitations of claim 1.
- g. **Claim 11, lines 1-2,4**, inherits all the limitations of claim 1.
- h. **Claim 13, lines 1-2,4**, inherits all the limitations of claim 1.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. **Claims 1,2** are rejected under 35 U.S.C. 103(a) as being unpatentable over Marchetto et al (US Patent No.: 5666378) in view of Aizawa et al (US Publication No.: 20020181574).

a. **Claim 1**, Marchetto et al discloses a detection signal by oversampling the received signal (Fig. 3, labels 102,104,fs and Abstract, lines 4-6), a symbol pattern synchronizing for detecting the timing of the symbol patterns based on the detection signal (Fig. 3, labels 126, and 132 and Col. 8, lines 38-47), equalizing means for acquiring an equalized signal by multiplying the signals extracted from said detection signal at predetermined intervals of n samples and weights (Fig. 3, labels 144,142) and weight updating means for updating the weights based on the detection signal and equalized error at timing of the symbol patterns (Fig. 3, labels 126,132,136,142,144 and Col. 9, lines 9-26). Although Marchetto et al does not disclose a symbol pattern generator and error calculating by subtracting the equalized signal from the reference signals, Aizawa et al discloses a symbol pattern generator (Fig. 2, label 201) and subtractor (Fig. 2, label to subtraction section 107 and Fig. 1, label 107). It would be obvious to one skilled in the art to provide symbol pattern generator

and subtractor to decrease computational complexity (page 1, paragraphs [006] and [007]).

- b. **Claim 2**, Marchetto et al discloses producing a quadrature signals (Abstract, line 6). IT would be obvious to one skilled in the art and based on designer decision to provide a quadrature signal demodulated by using 16QAM. Although Marchetto et al fail to teach updating weights using a least mean square algorithm, Aizawa et al discloses using a least mean square algorithm to compute the coefficients or weights. (page 2, paragraph [0025], lines 1-7).

8. **Claims 3** are rejected under 35 U.S.C. 103(a) as being unpatentable over Marchetto et al (US Patent No.: 5666378) in view of Aizawa et al (US Publication No.: 20020181574) and further in view of Tomisato et al (US Patent No.: 6862316).
- a. Claim 3 inherits all the limitaitons of claim 1, but claim 1 does not recite the limitaitons of a plurality of antennas, a plurality of detecting means, a plurality of equalizers, selecting means and data decision means. Tomisato et al discloses an adaptive array comprising a plurality of antennas and plurality of demodulators. (Fig. 1, label 10, and Col. 4, lines 46-48 and lines 63-67) Tomisato et al does not specify any mode of demodulation, thus it is possible to use a quadrature type of demodulating scheme to demodulate the inputted data from the antennas. Although Tomisato et al does not disclose a plurality of equalizers, selecting means and a data deicision unit, Kubo et al discloses a plurality of equalizers, selecting/data decision means for selecting the optimum

decision value. (Fig. 1, labels 5A-5C, and 6, and page 2, paragraph [0019]) It would be obvious to one skilled in the art to combine components found in Tomisato et al, Kubo et al's and Aizawa et al's invention to provide equalization means without increasing computational complexity. (page 1, paragraphs [0006] and [0007])

- b. **Claim 5** inherits all the limitations of claim 3.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. **Claim 7** is rejected under 35 U.S.C. 102(b) as being anticipated by Marchetto et al (US Patent No.: 5666378).

- a. **Claim 7**, Marchetto et al discloses a step of equalizing a detection signal obtained by detecting a reception signal at an oversampling rate and the reception signal includes known symbol patterns (Fig. 3, label 104,fs, Abstract, lines 4-10), a step of detecting a symbol synchronization position by detecting said symbol patterns based on said detection signal (Fig. 3, labels 126, and 128, Col. 8, lines 38-54), wherein the equalization processing is carried out based on weights updated when the synchronization position is detected (Col. 9, lines 5-39). Although Marchetto et al does not explicitly state using not updated coefficients when the synchronization position is not detected, Marchetto et al discloses updating the coefficients of the equalizer based on the difference between the pilot symbols received and pilot symbols equalized. The

synchronization timing signal is used to detect the timing in which the pilot symbols are equalized. Marchetto et al, inherently discloses, based on the information above, if there are no more pilot symbols detected, then the beginning and end of timing of the pilot symbols will not be detected and the coefficients will not be updated.

Claim Rejections - 35 USC § 103

10. **Claim 9,11-19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Marchetto et al (US Patent No.: 5666378) in view of Aizawa et al (US Publication No.: 20020181574) and further in view of Tomisato et al (US Patent No.: 6862316).
- a. **Claim 9** inherits all the limitations of claims 3 and 7.
 - b. **Claim 11** inherits the limitaitons of claims 1,3 and 7
 - c. **Claim 12** inherits all the limitations of claim 2.
 - d. **Claim 13** inherits all the limitations of claim 11.
 - e. **Claim 14** inherits all the limitaitons of claim 2.
 - f. **Claim 15**, Aizawa et al discloses a first, second and third weight multiplier unit. (Fig. 2, labels 209,210,211), and an adder for combining the outputs from the first, second, and third multiplier. (Fig. 2, labels 213, 209, 210, 211) Although Aizawa et al does not explicitly state the equation $G(t) = W_0 \cdot R(t) + W_1 \cdot R(t-nT) + W_2 \cdot R(t-2nT)$, as shown in Fig. 2, Aizawa et al discloses delaying the symbol patterns by a value of T (Fig. 2, labels 202,203,204), multiplying the delayed

symbol patterns by W_n , $n=1,2,3$ (Fig. 2, labels W1,W2,W3,209,210,211) and adding those outputs. Thus, Aizawa et al inherently discloses the output from the adder would be $G(t) = W_0 * R(t) + W_1 * R(t-nT) + W_2 * R(t-2nT)$. Although Aizawa et al only discloses delaying the symbol patterns by T , it would be obvious to one skilled in the art, based on the designers preference, to delay the symbol patterns by any number of delays.

g. **Claim 16**, Aizawa et al discloses a first and second n-sample delay unit (Fig. 2, labels 202,203,204), wherein the first delay unit outputs a first signal to a second delay unit and a second delay unit outputs a second signal to a third delay unit (Fig. 2, labels 202, 203,204 and outputs from labels 202,203). The outputs from the corresponding delay units are inputted into weight multipliers. (Fig. 2, labels 210,211 and 209)

h. **Claim 17** inherits all the limitations of claims 15 and 16.

i. **Claim 18** inherits all the limitations of claims 15 and 16, but claims 15 and 16 do not recite the limitations "a digitized quadrature detection I/Q signal is represented by $R(t)$ " and " T denotes an A/D converted 1-sampled time".

Although Aizawa et al does not disclose a digitized detection signal, Kubo et al discloses a digital oversampled received signal. It would be obvious to one skilled in the art to incorporate the digital oversampled received signal disclosed by Kubo et al to Aizawa et al's invention to provide reliable information "so as to output decision data with the highest reliability as decision data". (page 2, paragraphs [0029] and [0030]) Aizawa et al discloses delaying the symbol

pattern by 1 symbol or sample time at a time. (page 2, paragraph [0030], lines 1-2).

- j. **Claim 19**, Although Aizawa et al does not state outputting the equalized symbols at a rate detected by the frame/symbol synchronization circuit, Marchetto et al discloses outputting the non-pilot symbols from the equalizer based on the symbol timing. (Fig. 3, labels 126,128,132,134,136,148,146 and 142 and Col. 8, lines 38-54 and Col. 9, lines 5-46) It would be obvious to one skilled in the art to incorporate outputting the equalized symbols based on the symbol or sample timing to provide low signal-to-noise ratio. (Abstract, line 12)

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. Rademacher (US Patent No.: 6570918)
- b. Propp et al (US Publication No.: 20040075535)
- c. Lemois et al (US Patent No.: 6680966)
- d. Marchetto et al (US Patent No.: 5666378)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Linda Wong whose telephone number is 571-272-6044. The examiner can normally be reached on 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on (571) 272-3056. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2634

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Linda Wong



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